



**L293B  
L293E**

## PUSH-PULL FOUR CHANNEL DRIVERS

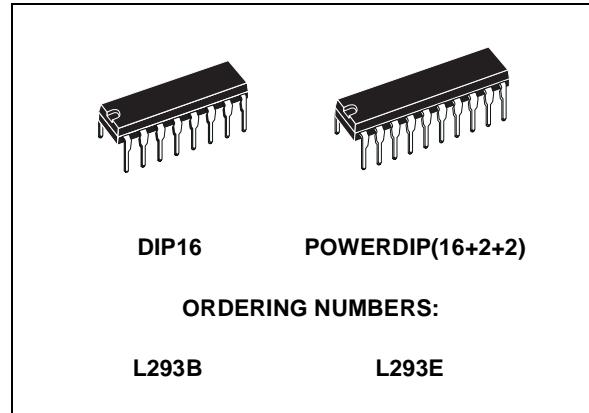
- OUTPUT CURRENT 1A PER CHANNEL
- PEAK OUTPUT CURRENT 2A PER CHANNEL (non repetitive)
- INHIBIT FACILITY
- HIGH NOISE IMMUNITY
- SEPARATE LOGIC SUPPLY
- OVERTEMPERRATURE PROTECTION

### DESCRIPTION

The L293B and L293E are quad push-pull drivers capable of delivering output currents to 1A per channel. Each channel is controlled by a TTL-compatible logic input and each pair of drivers (a full bridge) is equipped with an inhibit input which turns off all four transistors. A separate supply input is provided for the logic so that it may be run off a lower voltage to reduce dissipation.

Additionally, the L293E has external connection of

### PIN CONNECTION (Top view)



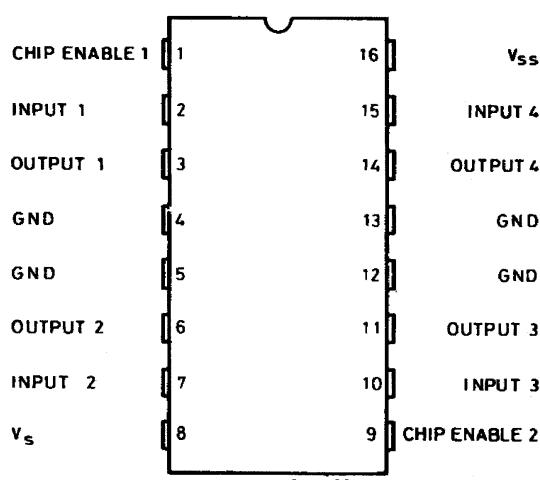
### ORDERING NUMBERS:

L293B                    L293E

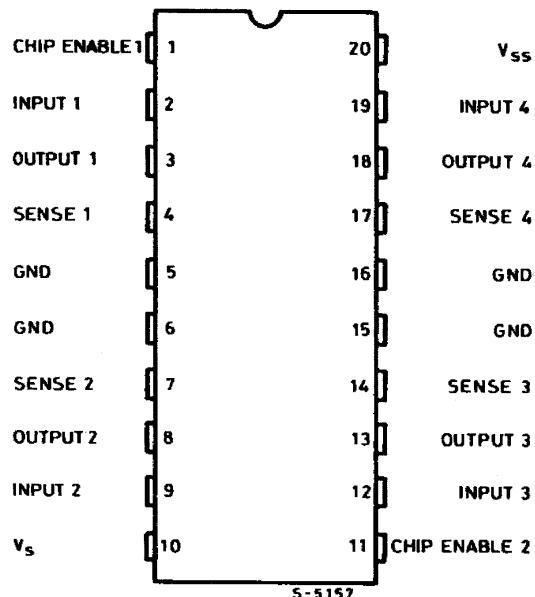
sensing resistors, for switchmode control.

The L293B and L293E are package in 16 and 20-pin plastic DIPs respectively ; both use the four center pins to conduct heat to the printed circuit board.

### DIP16 - L293B

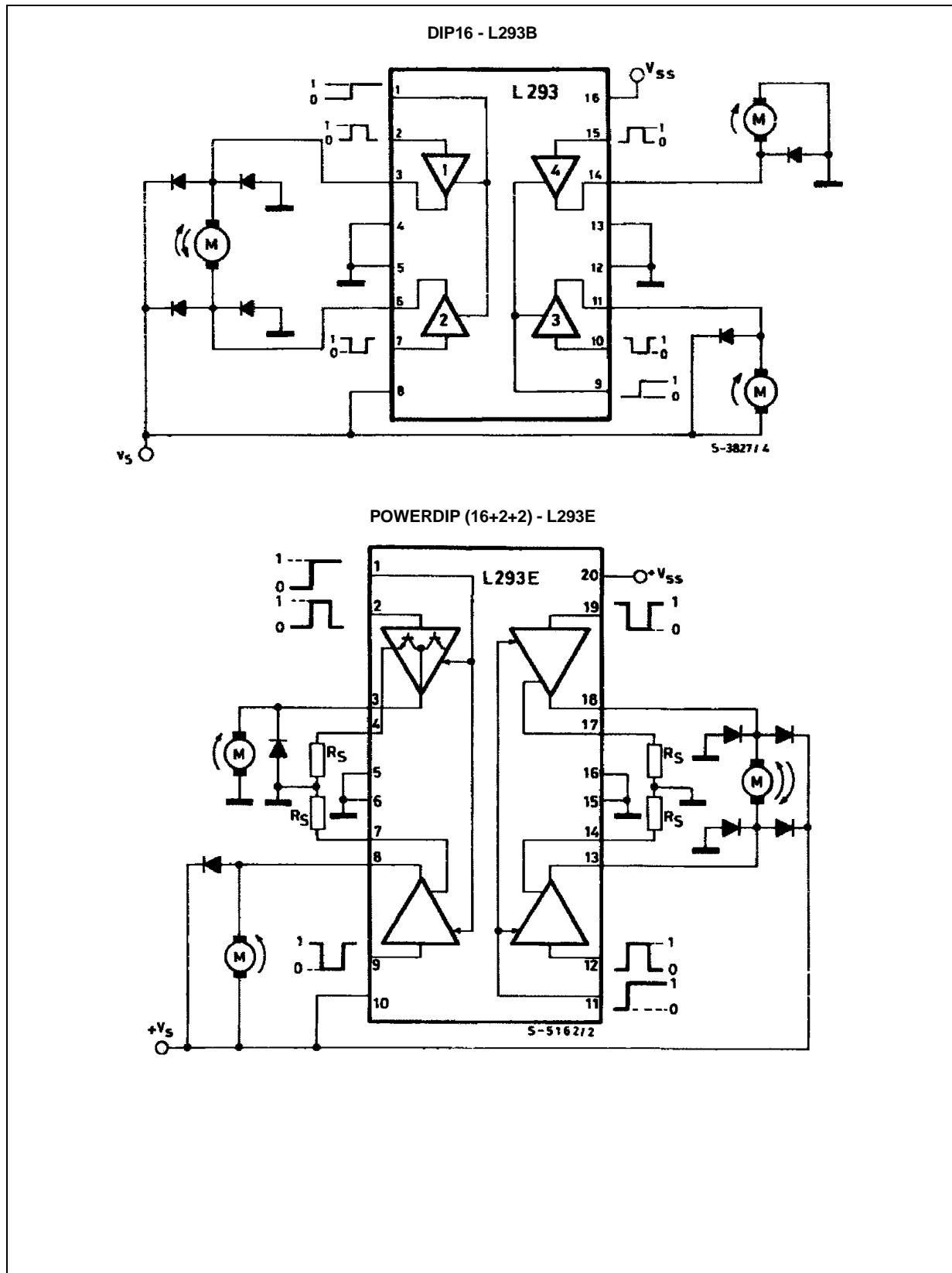


### POWERDIP (16+2+2) - L293E

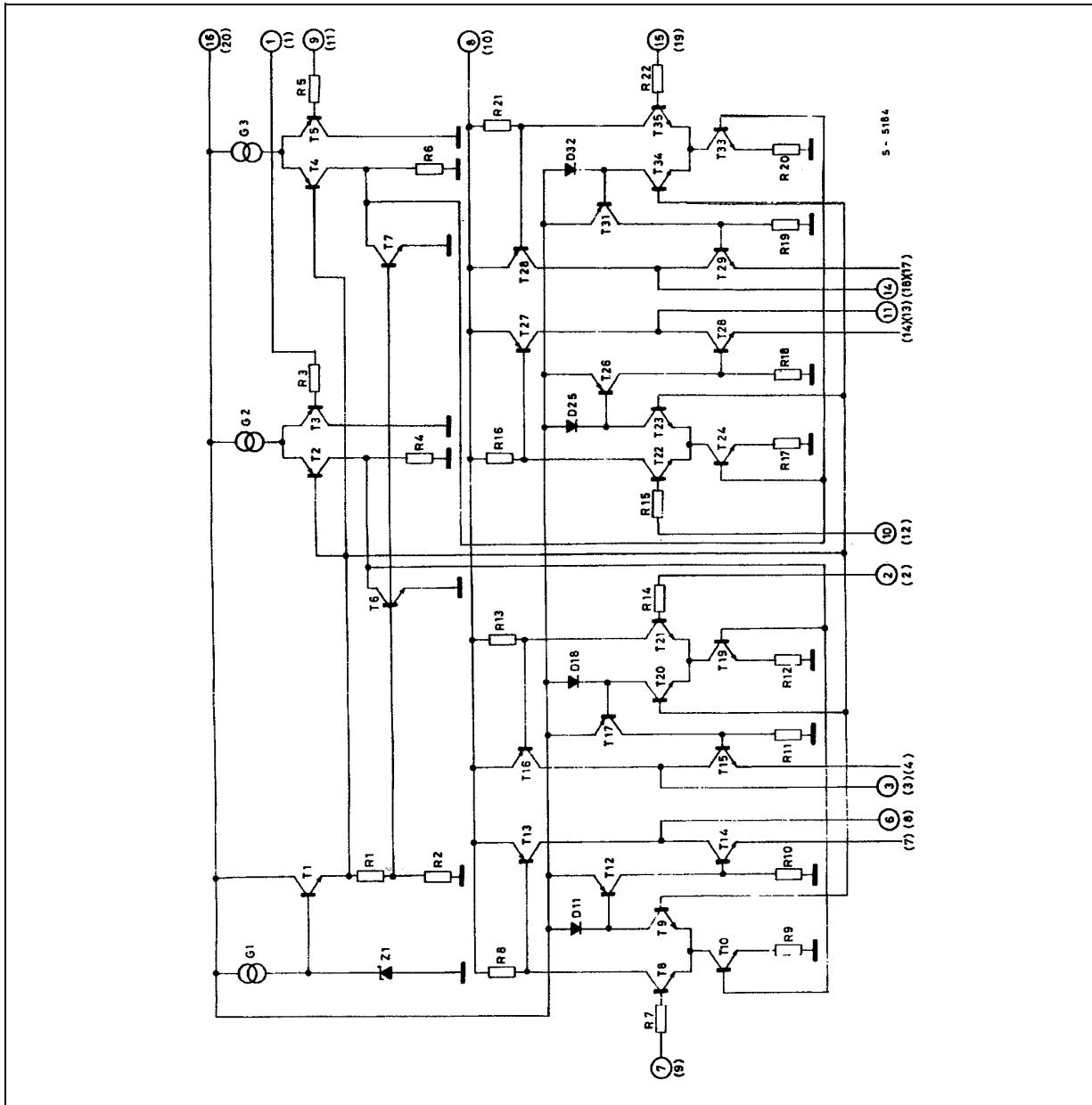


## L293E L293B

### BLOCK DIAGRAMS



## SCHEMATIC DIAGRAM



(\*) In the L293 these points are not externally available. They are internally connected to the ground (substrate).  
 O Pins of L293      () Pins of L293E.

## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_s$	Supply Voltage	36	V
$V_{ss}$	Logic Supply Voltage	36	V
$V_i$	Input Voltage	7	V
$V_{inh}$	Inhibit Voltage	7	V
$I_{out}$	Peak Output Current (non repetitive $t = 5\text{ms}$ )	2	A
$P_{tot}$	Total Power Dissipation at $T_{ground-pins} = 80^\circ\text{C}$	5	W
$T_{stg}, T_j$	Storage and Junction Temperature	-40 to +150	$^\circ\text{C}$

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### THERMAL DATA

Symbol	Parameter	Value	Unit
R <sub>th</sub> j-case	Thermal Resistance Junction-case	Max.	14 °C/W
R <sub>th</sub> j-amb	Thermal Resistance Junction-ambient	Max.	80 °C/W

### ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V <sub>s</sub>	Supply Voltage		V <sub>ss</sub>		36	V
V <sub>ss</sub>	Logic Supply Voltage		4.5		36	V
I <sub>s</sub>	Total Quiescent Supply Current	V <sub>i</sub> = L; I <sub>o</sub> = 0; V <sub>inh</sub> = H		2	6	mA
		V <sub>i</sub> = h; I <sub>o</sub> = 0; V <sub>inh</sub> = H		16	24	mA
		V <sub>inh</sub> = L			4	mA
I <sub>ss</sub>	Total Quiescent Logic Supply Current	V <sub>i</sub> = L; I <sub>o</sub> = 0; V <sub>inh</sub> = H		44	60	mA
		V <sub>i</sub> = h; I <sub>o</sub> = 0; V <sub>inh</sub> = H		16	22	mA
		V <sub>inh</sub> = L		16	24	mA
V <sub>iL</sub>	Input Low Voltage		-0.3		1.5	V
V <sub>iH</sub>	Input High Voltage	V <sub>ss</sub> ≤ 7V	2.3		V <sub>ss</sub>	V
		V <sub>ss</sub> > 7V	2.3		7	V
I <sub>iL</sub>	Low Voltage Input Current	V <sub>iL</sub> = 1.5V			-10	μA
I <sub>iH</sub>	High Voltage Input Current	2.3V ≤ V <sub>iH</sub> ≤ V <sub>ss</sub> - 0.6V		30	100	μA
V <sub>inhL</sub>	Inhibit Low Voltage		-0.3		1.5	V
V <sub>inhH</sub>	Inhibit High Voltage	V <sub>ss</sub> ≤ 7V	2.3		V <sub>ss</sub>	V
		V <sub>ss</sub> > 7V	2.3		7	V
I <sub>inhL</sub>	Low Voltage Inhibit Current	V <sub>inhL</sub> = 1.5V		-30	-100	μA
I <sub>inhH</sub>	High Voltage Inhibit Current	2.3V ≤ V <sub>inhH</sub> ≤ V <sub>ss</sub> - 0.6V			±10	μA
V <sub>CESatH</sub>	Source Output Saturation Voltage	I <sub>o</sub> = -1A		1.4	1.8	V
V <sub>CESatL</sub>	Sink Output Saturation Voltage	I <sub>o</sub> = 1A		1.2	1.8	V
V <sub>SENS</sub>	Sensing Voltage (pins 4, 7, 14, 17) (**)				2	V
t <sub>r</sub>	Rise Time	0.1 to 0.9 V <sub>o</sub> (*)		250		ns
t <sub>f</sub>	Fall Time	0.9 to 0.1 V <sub>o</sub> (*)		250		ns
t <sub>on</sub>	Turn-on Delay	0.5 V <sub>i</sub> to 0.5 V <sub>o</sub> (*)		750		ns
t <sub>off</sub>	Turn-off Delay	0.5 V <sub>i</sub> to 0.5 V <sub>o</sub> (*)		200		ns

\* See figure 1

\*\* Referred to L293E

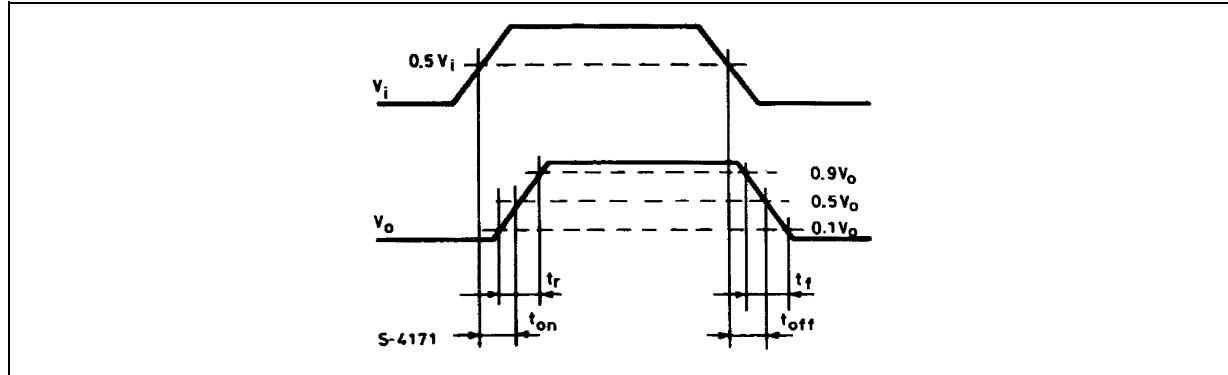
### TRUTH TABLE

V <sub>i</sub> (each channel)	V <sub>o</sub>	V <sub>inh</sub> (**)
H	H	H
L	L	H
H	X (*)	L
L	X (*)	L

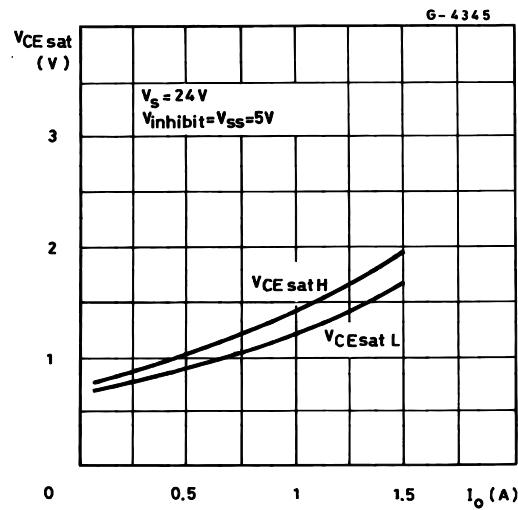
(\*) High output impedance

(\*\*) Relative to the considerate channel

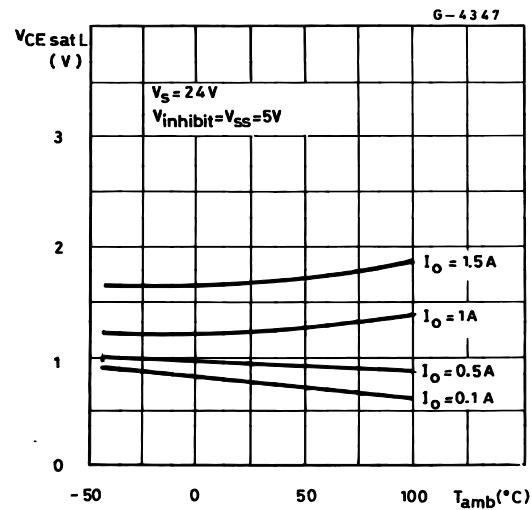
**Figure 1. Switching Timers**



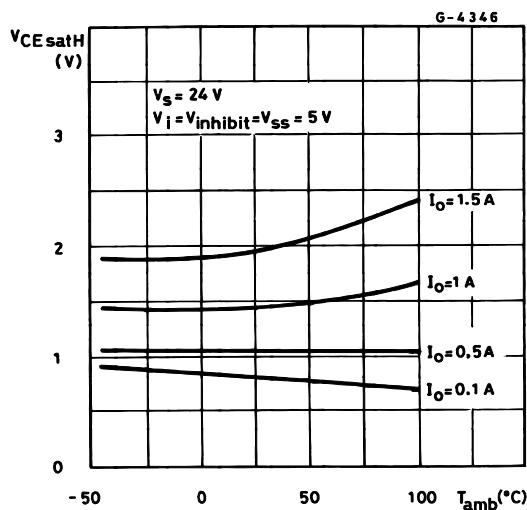
**Figure 2. Saturation voltage versus Output Current**



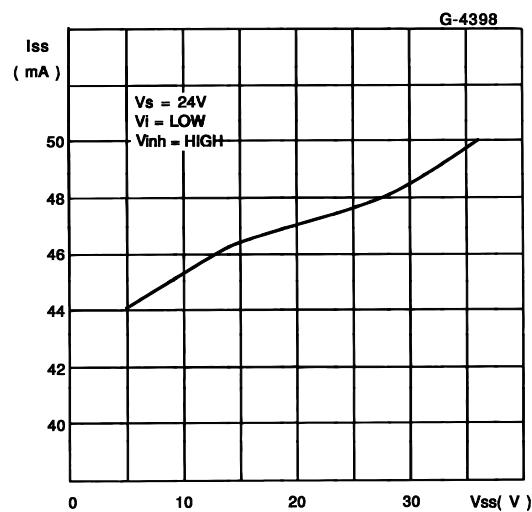
**Figure 4. Sink Saturation Voltage versus Ambient Temperature**



**Figure 3. Source Saturation Voltage versus Ambient Temperature**

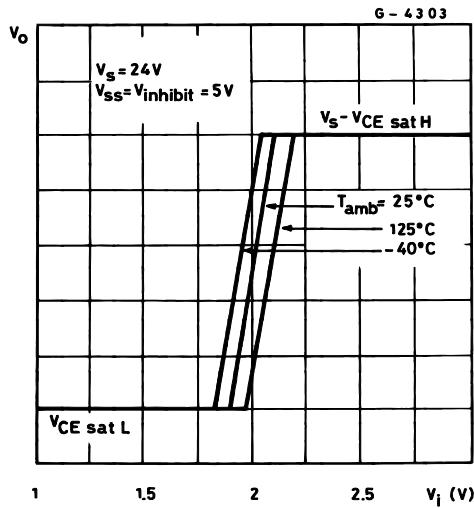


**Figure 5. Quiescent Logic Supply Current versus Logic Supply Voltage**

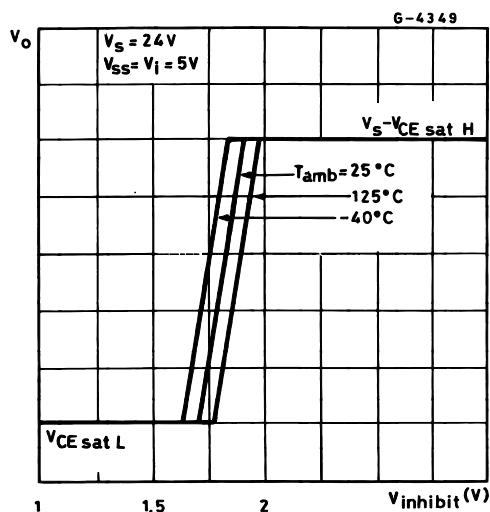


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**Figure 6. Output Voltage versus Input Voltage**

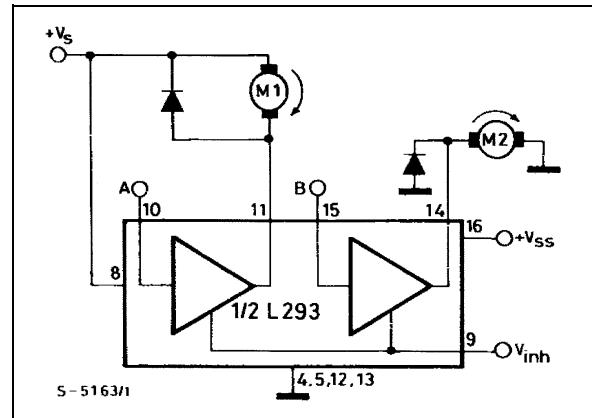


**Figure 7. Output Voltage versus Inhibit Voltage**



## APPLICATION INFORMATION

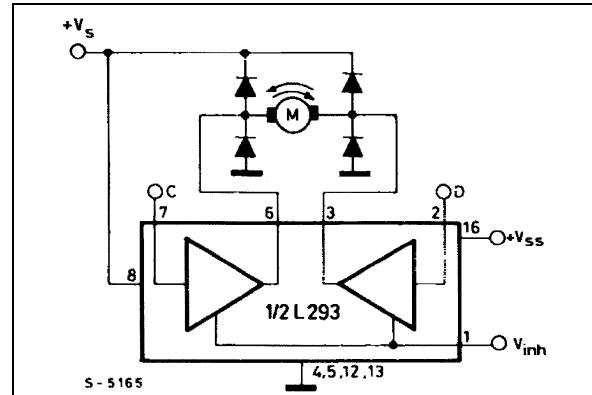
**Figure 8. DC Motor Controls  
(with connection to ground and to the supply voltage)**



V <sub>inh</sub>	A	M1	B	M2
H	H	Fast Motor Stop	H	Run
H	L	Run	L	Fast Motor Stop
L	X	Free Running	X	Free Running
		Motor Stop		Motor Stop

L = Low    H = High    X = Don't Care

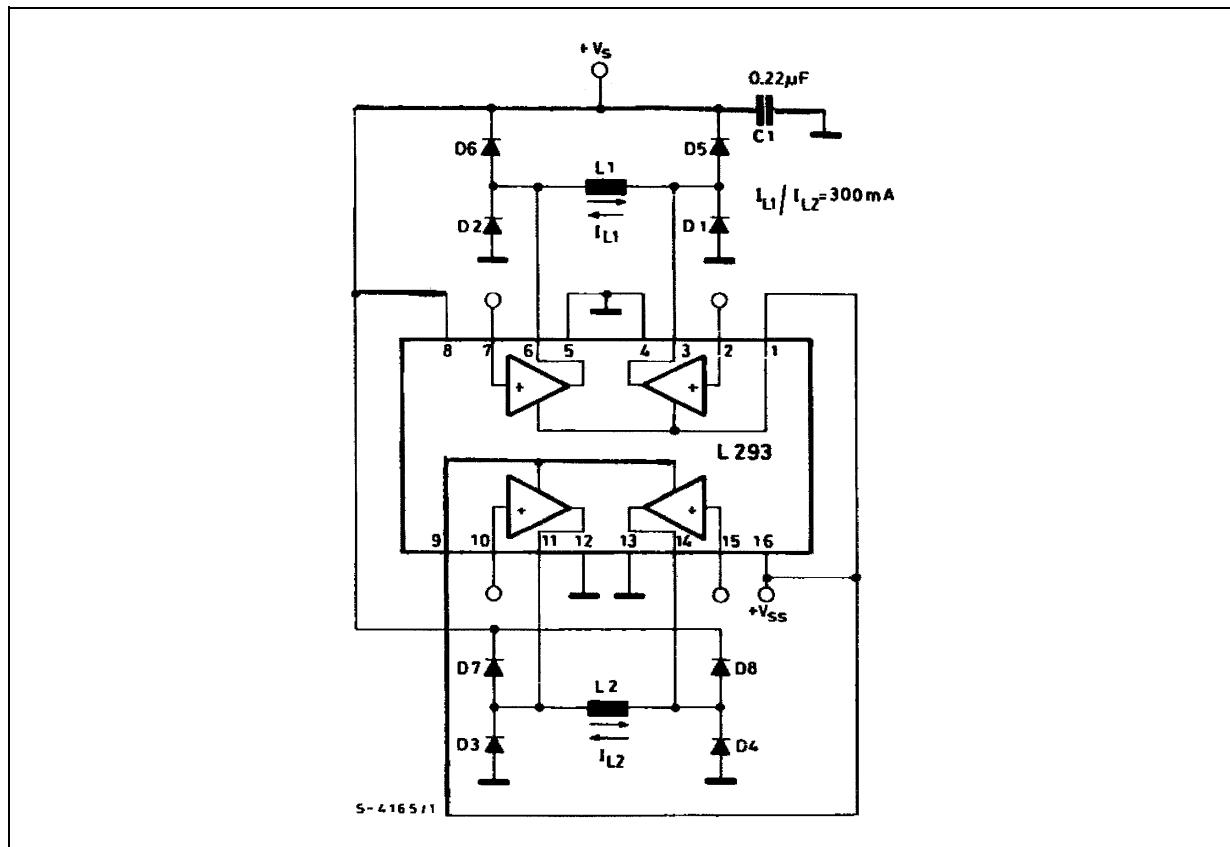
**Figure 9. Bidirectional DC Motor Control**



Inputs	Function	
V <sub>inh</sub> = H	C = H ; D = L	Turn Right
	C = L ; D = H	Turn Left
	C = D	Fast Motor Stop
V <sub>inh</sub> = L	C = X ; D = X	Free Running Motor Stop

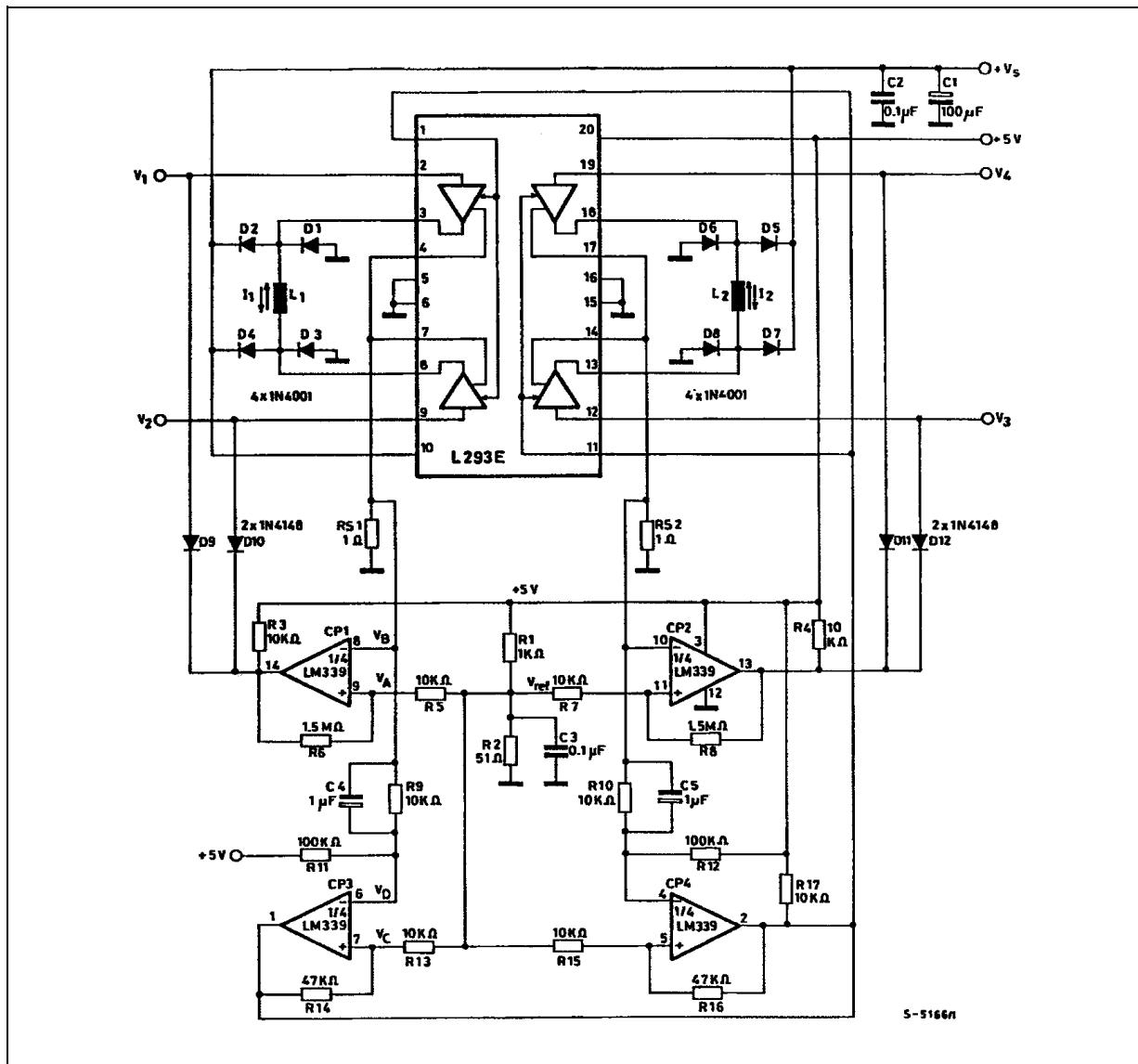
L = Low    H = High    X = Don't Care

Figure 10. Bipolar Stepping Motor Control



## L293E L293B

Figure 11. Stepping Motor Driver with Phase Current Control and Short Circuit Protection

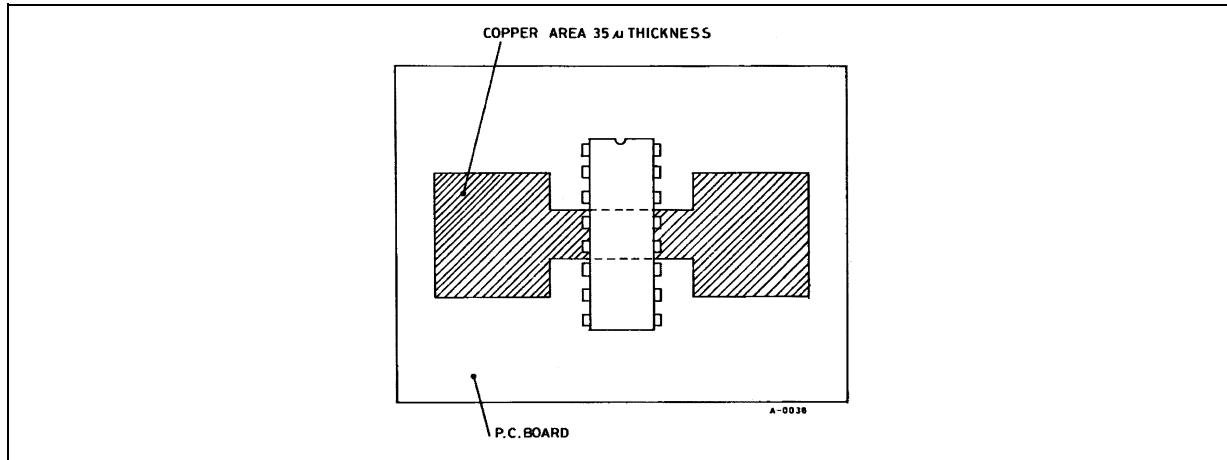
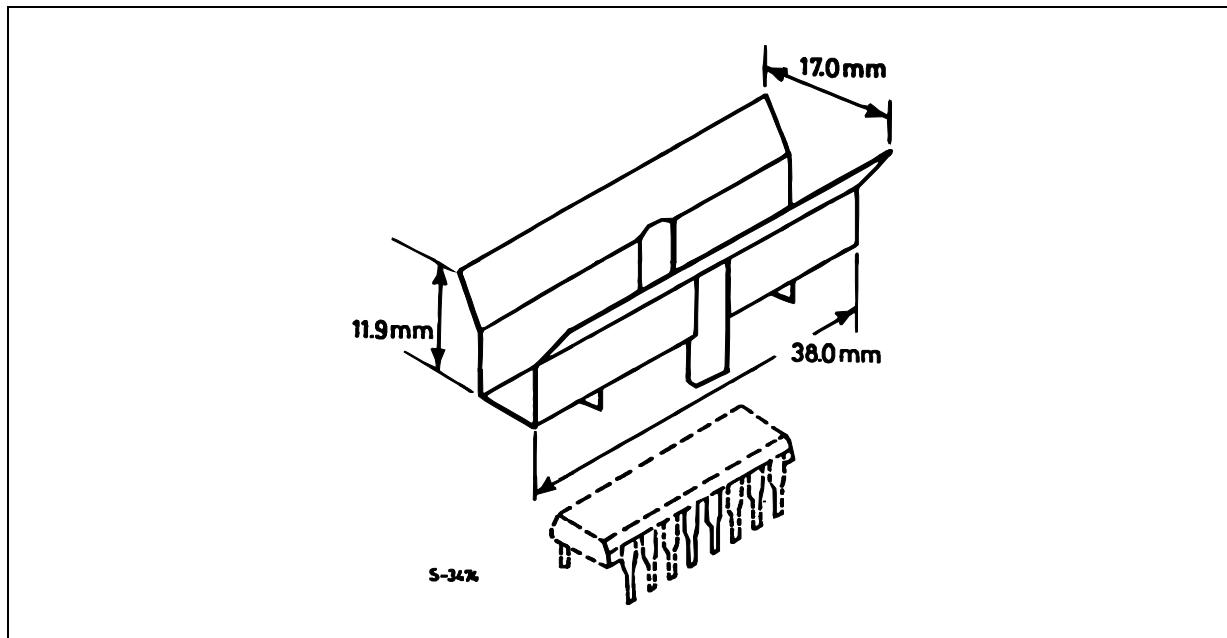


**MOUNTING INSTRUCTIONS**

The  $R_{th\ j\-amb}$  of the L293B and the L293E can be reduced by soldering the GND pins to a suitable copper area of the printed circuit board as shown in figure 12 or to an external heatsink (figure 13).

During soldering the pins temperature must not exceed 260°C and the soldering time must not be longer than 12 seconds.

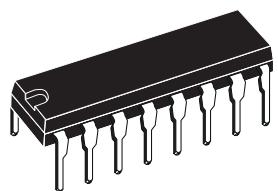
The external heatsink or printed circuit copper area must be connected to electrical ground.

**Figure 12. Example of P.C. Board Copper Area which is Used as Heatsink****Figure 13. External Heatsink Mounting Example ( $R_{th} = 30^{\circ}\text{C}/\text{W}$ )**

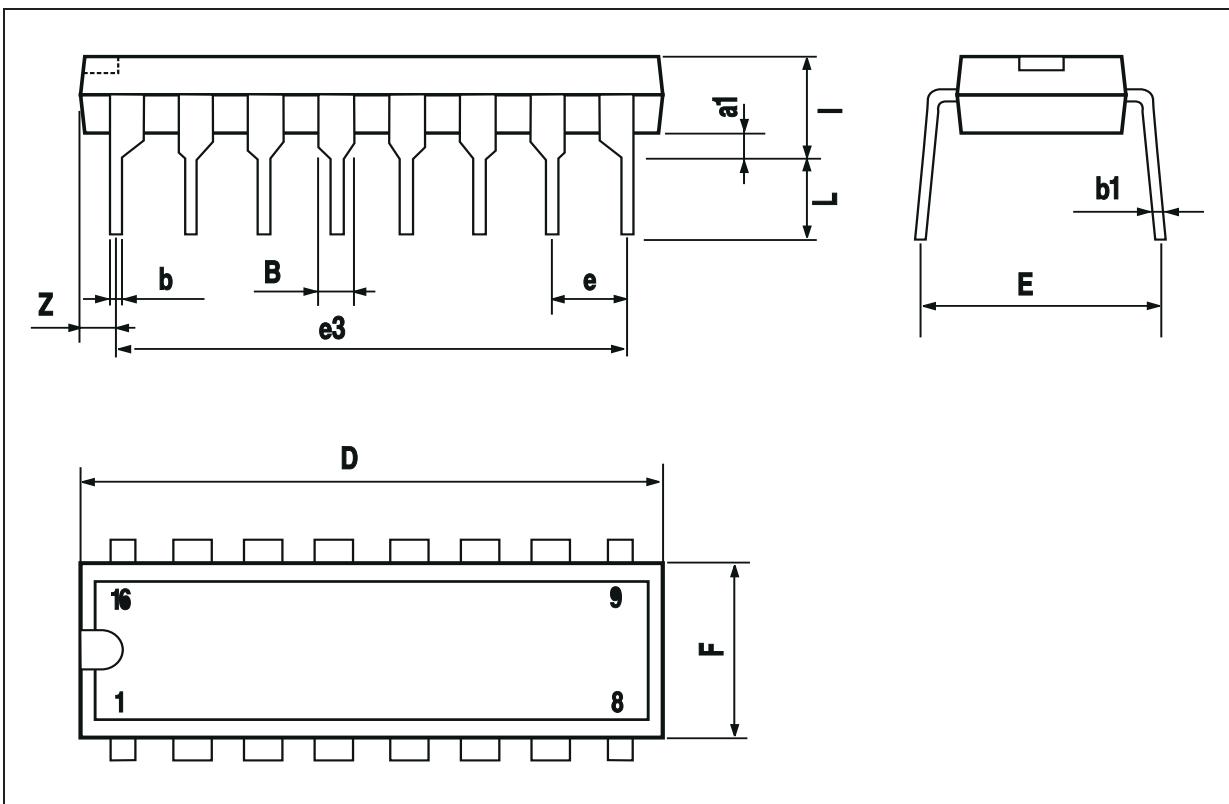
## L293E L293B

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050

### OUTLINE AND MECHANICAL DATA

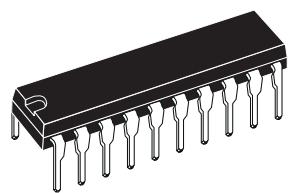


**DIP16**

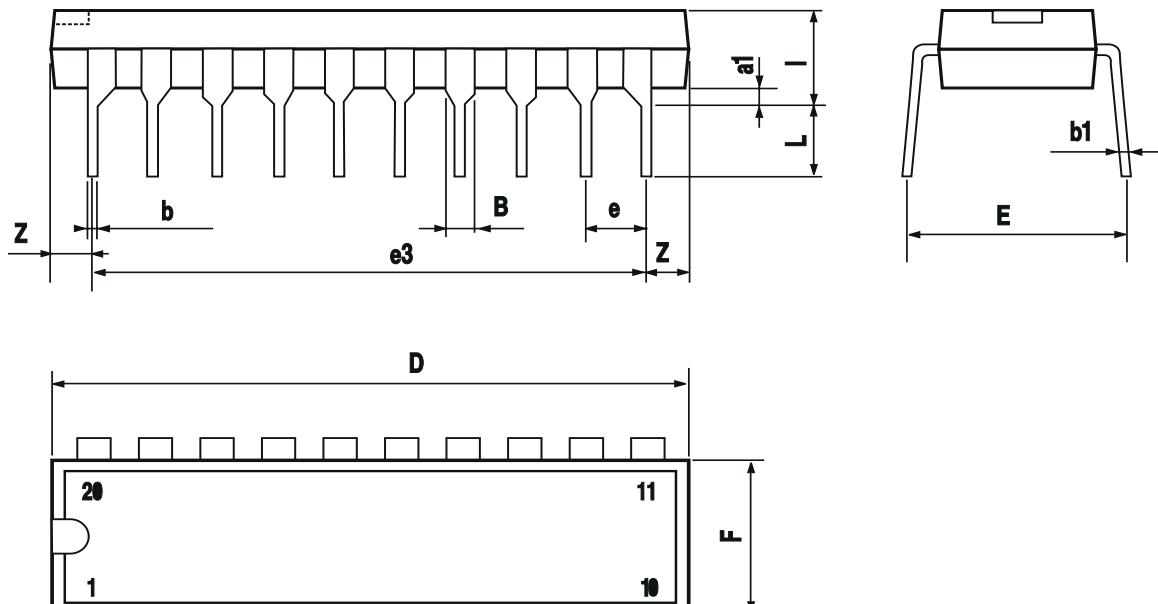


DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.85		1.40	0.033		0.055
b		0.50			0.020	
b1	0.38		0.50	0.015		0.020
D			24.80			0.976
E		8.80			0.346	
e		2.54			0.100	
e3		22.86			0.900	
F			7.10			0.280
I			5.10			0.201
L		3.30			0.130	
Z			1.27			0.050

**OUTLINE AND  
MECHANICAL DATA**



**Powerdip 20**



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